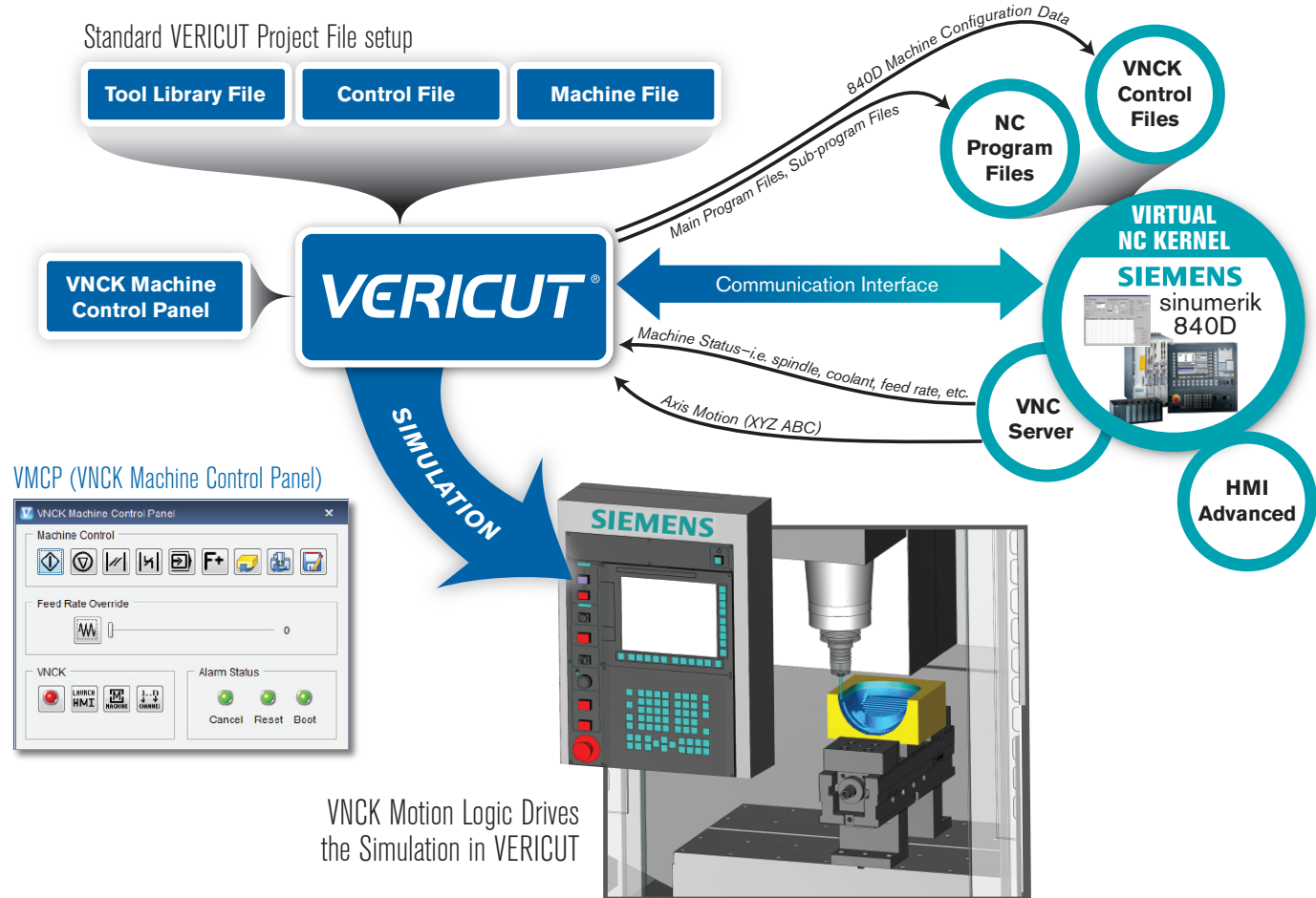# VERICUT®
CNC Machine Simulation Software

Siemens 840D Virtual NC Kernal
(VNCK) INTEGRATION WITH VERICUT

The kinematics of VERICUT's virtual CNC machine simulation is driven by the same 840D control software that drives the actual CNC machine!

Standard VERICUT Project File setup

| Tool Library File | Control File | Machine File |

840D Machine Configuration Data

Main Program Files, Sub-program Files

NC Program Files

VNCK Control Files

VNCK Machine Control Panel

VERICUT®

Communication Interface

VIRTUAL NC KERNEL

SIEMENS
sinumerik 840D

Machine Status—i.e. spindle, coolant, feed rate, etc.

Axis Motion (XYZ ABC)

VNC Server

HMI Advanced

SIMULATION

VMCP (VNCK Machine Control Panel)

VNCK Machine Control Panel
Machine Control
Feed Rate Override
0
VNCK — LAUNCH HMI — MACHINE — CHANNEL
Alarm Status — Cancel — Reset — Boot

SIEMENS

VNCK Motion Logic Drives the Simulation in VERICUT

VERICUT CNC Machine Simulation software is integrated with the CNC motion logic of the Siemens SINUMERIK 840D control using Siemens' Virtual NC Kernel (VNCK).

The VERICUT/VNCK module provides complete coverage of the 840D programming language. This includes advanced features, unique motion control techniques and high-level programming options.

Once the VERICUT/VNCK module is enabled, running the simulation is simple. The user selects the 840D configuration file for the specific machine and the main NC program to process, then starts the VERICUT simulation.*

NC axis motion time is calculated using the VNCK, utilizing the actual motion control logic of the CNC.

Right the first time. Every time.

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Additional Information Regarding the VERICUT/VNCK Module

The Siemens 840D Virtual NC Kernel (VNCK) is a stand-alone Windows program containing the Siemens 840D NC control kernel embedded within a server program. VERICUT (acting as a client program) asks the VNCK server to read and process an 840D NC program. The VNCK reads the program and sends axis position information to VERICUT for simulation.

VERICUT CNC Machine Simulation supports ARC file, SRAM file, VMF file, Single and Linked mode of VNCK. It is the Siemens VNCK license that will define which machine configuration file to use.

Under VERICUT/VNCK, VERICUT is not reading the NC program, the VNCK is. VERICUT is controlled by the VNCK. The VNCK reads the NC program, does all the motion processing, and calculates all axis positions. NC program lines containing the following NC program "events" are sent to VERICUT for processing:
- Any M-code
- Spindle speed
- Tool change
- Tool select
- Feed rate
- NC axis motion

VERICUT updates Siemens 840D system or user variables from any M-Code commands. A Siemens HMI application fits well in a VERICUT/VNCK simulation.

Probe simulation is available with VERICUT/VNCK. On a Probe command, VERICUT sends the contact point values in the direction of the motion to the VNCK server. To perform the probe motion, VNCK's logic will send the axis position values to VERICUT.

The VNCK is an additional program running on the workstation along with VERICUT, so hardware requirements increase accordingly. Dual or dual-core processors allow VERICUT and the VNCK to each use a processor, which improves performance significantly.

Configuring a target machine for VERICUT/VNCK requires CGTech services. Existing VERICUT machine and control files must be modified to work with the VNCK, and CGTech must create each specific machine configuration data file used by the VNCK.

Some complex machine configurations use "Compiled Cycles", special machine builder-created programs that enable specific machine features. If the target machine uses Compiled Cycles the original source programs must be recompiled for the NC kernel version of the VNCK. An example use of "Compiled Cycles" are the kinematics transformations required by Parallel-Kinematics Machines (PKM).

Because of the 840D's motion look-ahead processing, variable values are updated several lines ahead of the NC motion processing, giving the illusion that variable values and motion are out-of-sync during simulation. This is the exact same behavior seen on the physical control.

The 840D control processes from a fixed 64mb memory partition containing: the main and sub-program files, tool data, and all machine configuration data files. The VNCK exactly emulates this design, thus it is possible to exceed the VNCK's memory partition with a large NC program file. On the physical 840D CNC control it is possible to run the NC program file external to the VNCK's 64mb memory. This "external" mode also exists in VERICUT/VNCK, and can be used to avoid the memory limitation when processing large NC program files. But "external" mode presents other 840D processing behavior, such as:
- The VNCK sequentially loads segments of the main and subprograms into internal memory if processing in "external" mode. NC program branching commands that jump to a label outside the currently loaded segment will fail.
- When the main NC program file is processed "external", the sub-program files must be "declared" in the main program.

*Differences between standard VERICUT and VERICUT/VNCK

- It is only possible to step one "NC event" at a time. Lines not containing an NC "event" are skipped by the VNCK during simulation, such as: comments, variable setting or calculation, PLC events not triggered by an M-code.

- The VNCK does not always stop at the exact end location of a motion due to the NC's motion controller. Occasionally motion stops slightly before the theoretical end location.

- Only one main NC program file may be processed in a VERICUT setup, just like on the physical machine.

- Tools may only be added or changed in Tool Manager while VERICUT/VNCK is reset.

- Multiple channel machine configurations are currently not supported in VERICUT/VNCK.

- NURBS motion is currently not supported in VERICUT/VNCK.

- VERICUT/VNCK cannot use CGTech-created "simulation sub-programs" because all NC data is processed by the VNCK and must conform to the 840D control language.

- The Manual Data Input (MDI) function is not available with VERICUT/ VNCK due to a VNCK limitation. *It is possible to perform MDI motions pre-defined in a sub-routine created by the VERICUT MDI.

- OptiPath is not available with VERICUT/VNCK.

- IP files are not available with VERICUT/VNCK.

Right the first time. Every time.

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